CARNIVOROUS PLANT NEWSLETTER

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Front cover: *Utricularia resupinata,* eastern United States. For easy identification, note "rocker" aspect of flower and tubular bract on peduncle.

Rear Cover: *Pinguicula primuliflora,* northwestern Florida, USA. Plants are growing out in a cluster over surface of quiet stream. Note budding at leaftips. Photos by Don Schnell.

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All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the coeditors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

Views expressed in this publication are those of the authors, not necessarily the editorial staff.

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ICPS Seedbank

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04/25/94 Update

Byblis liniflora (4)
Dionea muscipula
Drosera. aliciae
D. auriculata
D. binata (1)
D. binata multifida extrema (5)
D. burkeana (1)
D. burmanni (2)
D. burmanni Beerwah, Qld (1)
D. capensis
D. capensis 'alba'
D. capensis 'Giant' (10)
D. capensis 'Narrow Leaf' (7)
D. capillaris alba (1)
D. coccicaulis (5)
D. dielsiana
D. esmeraldae (2)
D. filiformis X Calif Sunset (2)
D. glanduligera
D. indica 'rd plt, pk flwr'
D. indica 'rd plt, orange flwr' (8)
D. indica 'grn plt, pk flwr'
D. indica 'white' (5)
D. intermedia
D. intermedia 'Carolina Giant'
D. intermedia 'Tropical'
D. intermedia Giant (2)
D. intermedia "Brunswick, N.C."
D. intermedia 'Pine Barrens'
D. neesii ssp. neesii
D. peltata grn rosette Molgoa, NSW
D. peltata "Victoria"
D. platypoda
D. ramellosa
D. rotundifolia
D. rotundifolia 'Bruce Penn, CAN' (1)
D. rotundifolia 'Haines, AL' (13)
D. rotundifolia 'Freelton, Ont., Canada' (8)
D. rotundifolia 'S. Bohema Czech Rep.'
D. spatulata (5)
D. spatulata 'aihmi Prefect, Japan'
D. spatulata Woronora River, NSW (1)
D. spatulata 'Kansai' (1)
D. spatulata 'hairy sepals' Gympie, QLD (4)
D. spatulata 'North Island', NZ (3)
D. spatulata 'Hong Kong' (3)
D. spatulata "Queensland' (1)
D. spatulata 'New Zealand' (3)
D. sp. 'Magaliesburg' (3)
D. trinervia
S. alata Nigrapurpurea (1)
S. flava
S. flava 'Fitzgerald, GA' (7)
S. flava 'Ben Hill County, GA'
S. flava (Georgia)
S. flava N.C. (1992 harvest)
S. leucophylla
S. leucophylla 'all red' (6)
S. leucophylla Alabama
S. minor
S. purpurea
S. purpurea purpurea (7)
S. purpurea purp. Copetown, Ont, CAn.
S. purp venosa (6)
S. rubra
S. X alata X minor (1)
S. X (alata X psitacina) X alata (?) (5)
S. X catesbaei X self
S. X flava X leucophylla (4)
S. X leuco X alata (4)
S. X leuco X S. rubra (4)
S. X minor X flava (S. X harperi) (2)
S. X prittacina X rubra (4)
S. X chelsonii (13)
S. X willissi (6)
Utricularia chrysantha
U. subulata (1)
P. vulgaris Jeseniky Mts, Czech Rep. (4)

PLEASE INCLUDE A SELF-ADDRESSED-STAMPED ENVELOP WITH ALL U.S. CORRESPONDENCE $1.00/packet
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Los Angeles Carnivorous Plant Society forming. Those interested, Please contact Tom Johnson at (818) 248-1623 or P.O. Box 12281, Glendale, CA 91224-0981.

News And Views

Atlanta Botanical Garden (PO Box 77246, Atlanta, GA 30357)

Mrs. J. B. Fuqua has made a substantial financial gift to establish a tissue culture lab in honor of Ron Determann, superintendent of the conservatory. The lab will be under the direction of Ron Gagliardo who recently joined the Garden. The gift will permit high-tech equipment such as a laminar flow hood to be obtained. The initial foci will be on native endangered species such as our, terrestrial orchids, and a reliable tissue method to be used for sarracenias.

Ron Determann and Greenhouse Manager Becky Brinkman just returned from an extensive plant exchange trip throughout the State of Florida where they visited various private collections and botanical gardens. They returned with about 100 additions total in several groups, including some CP. Such exchanges and consultations between various gardens is of value in other ways. For instance, the recent severe hurricane damage to Fairchild Tropical Garden's rare plant house nearly decimated the collection, and ABG is doing it's part to help rebuild.

Ron Gagliardo (2343 Hunting Valley Drive, Decatur, GA 30033)

I wanted to update ICPS on the current and future activities of Hungry Plants. After developing an extensive local, national and international market for CP, Hungry Plants Carnivorous Plant Nursery essentially closed up shop in Raleigh, No and moved to Atlanta. Why? Well, the primary draw was a position offered to me by the Atlanta Botanical Garden, a place that I visited often and had developed a strong working relationship with. In October of 1993, I interviewed with Conservatory Superintendent Ron Determann and Greenhouse Manager Becky Brinkmann for a position working in the support greenhouses of the Dorothy Chapman Fuqua Conservatory. Meanwhile, back in Raleigh, the business had reached a point of critical mass! We either had to invest in more land and greenhouses and staff or scale back. Well, let me tell you, liquidating can be a wonderful thing (and also a major pain!). After accepting the position in Atlanta, we had a few "fire sales" to move out remaining plant material from our two locations in the Raleigh area. In mid November, I was on Interstate 85 headed south with all possessions! As for the tissue culture lab in Raleigh, well, that is now in use here in Atlanta at the Fuqua Conservatory.

As for Hungry Plants, well, they still exist, sort of. Hungry Plants now exists only as a foreign agent for another tissue culture lab in Florida called Agristgarts. We are working closely with Mr. Mike Rinck to develop foreign markets for CP and have passed most of our TC stock cultures over to his lab. Mike has dons a tremendous job in growing large numbers of Dionaea, Drosera and Pinguicula. Hopefully, he will soon be turning out large numbers of Cephalotus, Nepenthes and Sarracenia. Agristarts is an extremely well run corporation that is providing the highest quality foliage and carnivorous plants from tissue culture. All foreign orders are wholesale only (minimum quantities of 1,000) handled through Hungry Plants at 2343 Hunting Valley Drive, Decatur, GA 30033. Domestic orders can be sent directly to Mike and may require some minimum purchase, etc. He can be reached at Agristarts Ill, Inc., 1728 Kelly Park Rd. Apopka, FL 32718 Tel. (904) 889-6505 during normal business hours.

Eric Legatski (624 Filter Plant Dr., Fayetteville, NC 28303)

He is working with a group trying to restore old bog sites in Cumberland County, North Carolina, the Fayetteville and Fort Bragg area. He is looking for sources of fair quantities of seeds of *Sarracenia spp.* typical of those recorded in the area. He is also interested in communicating with anyone who would be interested in offering advice or any other assistance with the project. Restoration in certain situations is now considered a legitimate activity by most in the botanical field. However, it is a relatively new discipline and there Is little written about it except for scattered articles

and a few books of collected articles. Anyone who wants to communicate anything regarding this effort to Eric can reach him at the above address.

Andrew Paget (Paget's Orchids, PO Box 119, Mirboo North, Victoria 3871, Australia)
He writes that he has been doing a great deal of successful tissue culture ("flasking") with numerous CP species. He would like to contact others who are successfully flasking CP so that he can develop flask and seed exchanges with them. Write him for details. He will also pay for seeds of unusual variants of CP species with free flasks.

Barry Meyers-Rice (Steward Observatory, University of Arizona, Tucson, AZ 85721)
"I am one of the founding members of an electronic discussion group on carnivorous plants. This discussion group is accessible worldwide to anyone with normal e-mail (electronic mail) capabilities. Our group is relatively young, but already we have over one hundred and forty members from around the world. Our members participate in lively discussions on taxonomy, horticulture, tissue culture propagation, field trips, plant trades, general botanical interests, and all other matters which intrigue the carnivorous plant enthusiast. Membership to our group is free, all you need is access to normal e-mail channels. If any of your members are interested, have them write to me, or email their questions to one of the following email addresses...
Rick Walker: walker@opus.hpl.hp.com
Barry Meyers-Rice: bmeyersrice@as.arizona.edu
"One of our ongoing projects is to assemble several carnivorous plant related archives accessible to all. For examples, we have a complete list of all carnivorous plant species, thanks to Jan Schlauer, as well as lists of people who sell plants and a list of all the plants grown by the members of our list. I am in the process of making a new archive which will be a list of the carnivorous plant societies around the world. If you could provide me with the information I request, your society will be included in our list. This will increase the awareness of your group, and will help boost your membership. Finally, do you know of any other carnivorous plant, societies? I would appreciate getting their addresses so I may contact them."

Focusing on *U. prehensilis*-an Inquisitive Plant

Barry Meyers-Rice, Steward Observatory, University of Arizona, Tucson, AZ 85721

This is the second in a sequence of articles showcasing Utricularia, species. In this series I integrate the information in Peter Taylor's taxonomic monograph with my own CP horticulture experience. Since Utricularia in CP collections are so often misdentified, I will carefully describe the species being highlighted so you can determine if you are growing it yourself. I warn you against trusting the veracity of your plants' name tags, even if they came from seemingly reliable commercial sources (who may be more confused about Utricularia than you!). Unfortunately this is probably also the situation with Drosera, especially rosetted species. The subject of this Focusing on Utricularia is *U. prehensilis*-a popular plant that is easy to grow and fairly free flowering, although not as floriferous as *U. sandersonii* or *dichotoma.* Its species name comes from an interesting feature you usually do not associate with CPs-but more about that later.

Once I showed a, pot of a nonflowering Utricularia to some relatives. When I did, they looked at it and asked questions like "When will it germinate?" and "Died on you, did it?" When I explained to them that the tiny leaves were what I was growing ("No, not next to the 'tiny moss,' it is the "tiny moss""), they shook their heads and walked away muttering. I knew then I was out of the will. With prehensilis this would not have happened-even out of flower it is unmistakable something is growing in the pot. The leaves are lime green and moderately large-in cultivation they are commonly tip to 2.5 cm long and Taylor reports plants with 10 cm leaves. They are only about 3 mm wide, strap shaped, and terminate with a blunt rounded tip. The leaves are multiveined with a central nerve running along the middle of the leaf and many smaller secondary nerves that branch to the leaf margins. If grown in strong light the nerves and other parts of the leaves are often reddish. They usually lie flat on the soil surface (but can be semierect), and as in many small Utricularia do not form a rosette-instead they emerge above ground in unpredictable spots. The underground bladders are up to 1.5 mm across, and smaller bladders are often sporadically formed on the undersides of the leaves, especially if the plant is kept very moist.

Cared for properly, a small clump of *U. prehensilis* will quickly colonize its entire growing area. When the leaves are so densely packed they lie on each other in tangled confusion, the plant may produce a green or golden brown scape about 1 mm thick and round in cross-section. It grows vertically until it is 15 cm or more tall and then it starts to twine. As it grows, the upper several cm waves and wanders through the air in search of something to spiral around. The motion is slow-it takes a few hours for it to move appreciably—but when it Ends something it winds tightly about it. Strangely, sometimes the next day you may discover that the plant has unwound itself and wound onto something else. This prehensile nature is the origin of the specific epithet prehensilis. Only the most recently developed 5 cm or more of the scape is mobile, so as the tip continues to grow, the length of non-twining scape increases. The scape always twines to the right when viewed from the side. In other words, a scape winding its way around a stick as it climbed it would wrap itself around the stick counterclockwise as viewed from above. About twenty Utricularia species may twine, and all grow in this direction except the African plant *U. appendiculata* which grows in the other direction. Each *U. prehensilis* inflorescence produces one to several odorless flowers. They are spaced by up to several cm, and mature slowly. When each flower bud is ready to open, the portion of the peduncle it is attached to is no longer twining and has stabilized. No matter what orientation the peduncle right have gotten itself into, even straight down, the pedicel twists around so the flower is borne level.

The corolla (Figure 1) is pure yellow and is remarkably similar to yellow-flowered species of Linaria, commonly known as Toad-flax or Butter-and-eggs. In my previous

article (Focusing on *U. calycifida*) I defined some botanical terms useful in describing Utricularia flowers and you may find it helpful to refer to my drawing in that issue. The lower lip is about 1 cm long and 1 cm wide. It is approximately obviate-sometimes with a suggestion of having two or four lobes—and its edges often slightly curl towards the ground. A striking feature of the lower lip is its large inflated palate bulge located near where the lower lip emerges from between the calyx lobes. Three grooved indentations parallel to the long axis of the flower divide the bulge into four swollen lobes. The upper lip is a few mm wide and up to several mm long. Its shape varies, and can be strap-like or spathulata with an end that is rounded or, as often the case with my plants, forked to a depth of a few mm. It usually curves over the inflated palate bulge. The spur is conical, sharply pointed, and is as long as or longer than the lower lip. The spur points away from the lower lip by nearly 180 °. My flowers average about 1.5 cm long, and this agrees with Taylor's stated range of 0.8-2.0 cm. The two calyx lobes are both ovate or elliptical, and the upper calyx lobe is always at least a little larger than the lower lobe. When the flower is open the lobes are about 5 mm long, but when a fruit is developing they can enlarge to twice this size. Each flower is attached to the peduncle by a pedicel 1 cm long (Taylor reports a range of 0.3-1.8 cm) that is distinctly flattened in cross-section. Where it attaches to the peduncle is a small (1.5-2.0 mm) tapered bract and two shorter and much narrower bracteoles.

Utricularia can be variable in many ways, especially flower color. But as a rule yellow flowered species like prehensilis are almost always consistently yellow flowered. In contrast, species that have flowers colored with whites, pinks, lilacs, and purples are prone to great variation in flower coloration (i.e. see the discussion of *U. calycifida* in the last installment of this series). Of course there are some exceptions to this, for example those yellow flowered plants which can produce small white or reddish cleistogamous flowers (e.g. subulata), or two species that are normally purple

Figure 1: A flower of *U. prehensilis*. This flower is only 1.5 cm long.

Figure 2: A raceme of *U. prehensilis* climbing a chopstick. Notice the large spacing of flowers, and that the part of the peduncle with mature flowers has stopped twining.

but with occasional yellow forms (i.e. *spiralis and tortilis).* Still, it is a useful rule to remember.

Cultivation of this species is easy. It will grow in pure milled Sphagnum or a 2:1 peat-sand mix. I grow mine in moss and my plants flower well. I do not advise live Sphagnum, especially species with coarse and large tufts, because they will overwhelm the Utricularia. As with all my CPs, I use water purified by distillation or reverse osmosis. I keep the water level 2-5 cm beneath the soil surface but some growers raise the water level to the soil surface or even submerge the plants when they become established. I have found this to be a successful method but if you grow your pot of prehensilis in a deep tray of water with other CP pots, stolons from the plant will quickly grow out of the pot and invade the neighboring pots. This plant enjoys warm temperatures but is not picky, 15°-32°C (60°—90°F) is fine. If temperatures are too high, the flower scapes may abort, even if they are more than 30 cm long. I grow my prehensilis in terraria under fluorescent lights and in the greenhouse under 50% shade cloth. Its cultural needs are easily met, so the only challenge the plant offers is when it flowers. Left on its own, the questing scape will quickly find other nearby plants-including other prehensilis scapes-and will wind around them. I forgot about this once and when I checked on the plant a few weeks later, one scape had found my *D. regia* and the other a large clump of *D. binata dichotoma*—when I finished untangling the mess I was thoroughly slimed. The easiest way to restrain the plant is to insert a vertical stick into the pot and let the scapes wind around that. I use chopsticks, and when they reach the top I train them back to the bottom and let them climb up again (Figure 2). Since crawling pests such as wingless aphids use toppled scapes as bridges from one pot to the next, training the scapes can decrease the occasional insect problems that inevitably occur in greenhouses.

In the wild, *U. prehensilis* grows in tropical and South Africa, and in Madagascar. In this range it grows in bogs and often shallow water. It typically flowers during the wet season, but in permanently wet conditions it flowers all year. I keep my plants constantly wet and they flower year round, but most heavily during the late winter and spring.

Growing and studying carnivorous plants is fulfilling for many reasons. We may marvel at their beauty and form, be fascinated by how they fill difficult ecological niches, enjoy the challenges posed by growing them, or even take ghoulish delight in how they devour their prey. But as I watch the curiously probing scapes of *U. prehensilis* thrash around, fitfully searching the air one day and then sliding against a terrarium wall which offers no foot-hold (and I use that term uneasily) the next, I know it is the only carnivorous plant that makes me laugh.

Growing Terrestrial *Genlisea*

Barry Meyers-Rice, Steward Observatory, University of Arizona, Tucson, AZ 85721

Late in the summer of 1991 I received in trade a plastic bag filled with live Sphagnum. Carefully exploring through the strands I was thrilled to discover that the object of my desire had survived the shipping ordeal, and I finally had an opportunity to grow a *Genlisea*. My new acquisition was smaller than a grain of rice, so I planted it immediately. Some species of Genlisea are aquatics and others are terrestrials. I wasn't sure of my new plant's preferred habit, so to be safe I embedded it in a loose mix of live fluffy Sphagnum just a few cm above the water table. The plant is now thriving and has taught me many things about growing species from this genus.

Despite its reputation as a difficult plant, my first species (*Genlisea hispidula*) is very accommodating. I grow mine in live or unmilled dead *Sphagnum*. A more densely packed medium (such as a peat or sand mix) may not allow tiny aquatic creatures to swim into the traps. I keep the water table near or just below the moss surface. Of course, use only pure water for these plants. I grow mine under 50% shade cloth. The spatulate or cuneiform leaves (up to three cm long each) are arranged in a rosette. The

plant sometimes becomes covered by heads of growing *Sphagnum*. When this happens I pull the strands back to keep the plant from becoming buried. Kept at about 18 °—35°C (65°—95°F) the plant will grow quickly. Cooler than this and its growth slows. I suspect a frost, however light, would be the end of your Genlisea. Fertilizer is not necessary so I have never used it.

When the rosette matured it produced an unbranched scape 20 cm tall with several flowers (Figure 1). As I examined the flowers something kept nagging me—I felt they reminded me of something but it wasn't until I was composing this article that I realized what it was. The arching lid-like upper corolla lip, the strange lower lip, and the sub-conical spur conspire to mimic the lid, peristome, and basin of a Cephalotus pitcher (But I am not suggesting the flower is carnivorous!). Carefully following Peter Taylor's key in CPN 20:1, p22, I was easily able to identify the plant as *G. hispidula*. I was slightly surprised the plant was correctly identified when it was sent to me—a real rarity with the related genus Utricularia!

The carnivorous traps on this genus are produced below ground from the rosette base and are shaped like an inverted "Y" a few to several centimeters in total length. Excellent line drawings of the traps can be found in Lloyd or Slack's first book. Midway between the trap's point of attachment and the bifurcation is a tumerous swelling—the utricle. This digestion chamber is the ultimate destination for wayward rotifers. A tube connects the utricle to the trap bifurcation. Each of the two branches of the trap is tightly twisted into a helix. A slit spiraling along the length of the helix allows free-swimming organisms into the twisted canal. Once inside, the creatures are constrained to swim along the inside of the canal by that old standby in plant carnivory (and something I feel I have read countless times), inward pointing hairs. These hairs allow the creatures to swim only towards the trap's utricle. Occasional columnar structures called prop-cells connect the walls of the canal and keep them spaced at a fixed, optimal separation. There are many unanswered questions regarding the function of the traps. After this article I present an order of magnitude calculation to explore if Genlisea suck water through their traps in order to accentuate their efficiency. But despite our poor understanding of the mechanics of the Genlisea traps they are effective. The utricle of older traps are clearly discolored by the internal accumulation of digested material and detritus.

A more recent addition to my CP collection is *G. violacea*. This plant is smaller in all respects than *G. hispidula*, with petiolate elliptical leaves 2 cm in total length. In flower it is much different, and resembles from the front a small *Viola* flower (Figure 2). The flowers are spaced only a few centimeters apart, and are long-lived enough so that several flowers are in full bloom in a lovely spray at all times. It grows well using the same culture as for *G. hispidula*.

These species, especially *G. hispidula*, are easy to propagate. For vegetative propagation use cuttings from leaves or traps. Some even report success using scapes! The cuttings should be partially buried in live Sphagnum. For leaf cuttings, remove as much of the petiole base as possible, and anticipate the new plantlets to develop anywhere on the leaf. Leaves can be cut into pieces for more plantlets. If scape cuttings actually work, I expect the new plants would develop from the peduncle scales. This species will produce viable seed even if not selfed. When the seed capsule matures and splits (see Taylor's figure 1—5, CPN 20:1, p34, for the remarkable details of capsule dehiscence), sprinkle the seed immediately on wet Sphagnum. Germination will occur in a few weeks. Treat cuttings and seed as you would mature plants. The species *G. violacea* is a little more challenging. Selfings don't produce seed, and leaf cuttings have never struck. I owe a thanks to Gordon Snelling who first told me about the success of trap cuttings. In fact when I have examined the traps still attached to a plant I have noticed parts of the traps (especially the tips) may develop adventitious leaves which grow to the soil surface and produce new plants.

I hope I have whetted your appetite for these remarkable little plants. In attention to detail their traps are the most complex of all the carnivorous plants—second

perhaps only to Utricularia. Their flowers are delightful, and when the species discussed here reach flowering size they continually produce scapes all year. And the plants are easy! If you can grow terrestrial Utricularia then you can grow the plants I described here. I have never grown an aquatic Genlisea, and anticipate they may be more exacting in their treatment (as is the case with most aquatic Utricularia). Very recently I have obtained specimens of *G. repens* and a plant which may be *G. pygmaea*. Time will tell how much luck I have with them. Good luck with yours!

Figure 1: Flower of *G. hispidula*

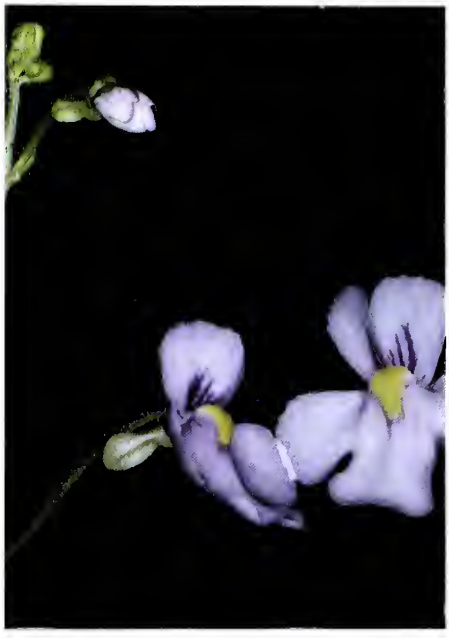

Figure 2: Flower of *G. violacea*

Growing Carnivorous Plants in a Semi-Arid Climate

Richard H. George, 1400 Western Village Dr., San Jacinto, CA 92585

I live in Southern California approximately 100 miles (160 KM) east-southeast and inland from the City of Los Angeles. Although this area is not classified as a desert, it has the feel of one in the summer: it is hot and very dry. Technically, with 13 inches of annual precipitation (33 cm) the climate is considered semiarid and is classified as a Mediterranean, dry-summer type; almost all the annual rainfall occurs in the winter months. The daytime high temperatures in July and August average over 100 °F (37.8°C). Maximum temperatures can exceed 110 °F (43.3°C). Rainfall during the summer months is almost nonexistent. The elevation here is 1517 feet above mean sea level (462 meters). Because of the hot, dry air and relentless sun, the climate is very hostile to tender, water-loving plants. In spite of the climatic difficulties I have been growing carnivorous plants (CP) outdoors for the last 15 years. Several of my Sarracenias were obtained as two-year old plants in 1976 and are still flourishing. None of the plants are grown in any kind of shelter; all are grown in pots standing in the direct sun.

I had always read that CP required very high humidity to survive. When I first started growing CP in Southern California I attempted many different methods of maintaining high humidity in and around the plants: I grew some indoors under lights; I grew some outdoors in terrariums and other contraptions designed to retain high relative humidity. The indoor experiments resulted in limited success. The plants would flourish and grow with great vigor for a year or two, then would slowly decline.

After a while I realized that the plants required a dormancy period in the winter that I was having difficulty providing with indoor growing conditions. The outdoor plants in various forms of terrariums did not fare as well. Generally, if the outdoor terrarium plants received enough sunlight to match their needs, they could not survive the high temperatures resulting from semi-enclosure in glass or plastic cases. If the plants were placed in locations where the sun did not burn them, they didn't receive enough light for health and vigorous growth.

The solution was to attempt to grow them as 'normal', potted plants. All the plants were placed in one gallon or larger, plastic pots in a mix of peat moss and sand, and placed in deep saucers. Most of the plants seem to do well for me in a mix of two parts peat moss to one part sand. In the past all watering was by top watering with sufficient quantity to cause the saucers to overflow. When the saucers dried out completely, the plants would be watered again. Because of the five year drought in Southern California I have switched to using seven-inch deep trays that hold five or six pots each to prevent water loss by overflow. An additional benefit is that the plants need to be watered less frequently than they did with shallow saucers. However, an unforeseen benefit is that they appear to grow much better with the deep tray watering system.

Many plants grown using this method in this climate are large and robust, though not as robust as they would be if grown in their native habitat. Some Sarracenias grow so quickly that they can overwhelm a one gallon pot in about two years. One example is a red-tube variety of *Sarracenia flava* that has been growing in a two gallon pot for just over two years. It was planted as a mature rhizome acquired from World Insectivorous Plants. At the time the rhizome only had a single growth crown. It now has multiple growth crowns and is deforming the pot in which it is planted.

One possible aid to plant growth is the proximity of several dairy farms and the hoards of flying insects they support. The quantity of insects that the upright Sarracenias and large Droseras capture over the summer is surprising. In addition to the abundant insects available to the plants they seem to create their own microclimate and microecological system. Many predatory insects, spiders, and several frogs have taken up residence in and around the pots. Small spiders weave webs at the mouths of Sarracenia leaves; praying mantises and jumping spiders sit near the tops of the leaves in a head-down attitude awaiting the arrival of new prey; frogs usually sit on the soil in the pots but occasionally will sit on a leaf like a praying mantis; and black widow spiders try to occupy the areas between the pots. I try to discourage the presence of the black widows.

While the Sarracenias are prolific and grow very well, the maximum leaf height for the upright Sarracenias is only about 20 to 24 inches, which is substantially smaller than those growing wild in the Gulf Coast States. Having a growth pattern that keeps their leaves close to the ground, *Sarracenia purpurea venosa* seems less affected by the heat and grows very large in this semiarid climate. While many CP from temperate climates do well here, the carnivorous plants that seem to thrive in this climate tend to be Australian varieties such as *Drosera binata, Drosera burmanni*, and *Byblis liniflora*. In particular, the Byblis only truly thrives during the dog days of August when it overwhelms any pots in which it is growing.

From December into February the night temperatures are usually at or below freezing and may dip as low as 15 °F (-9°C). This has proven adequate to initiate the dormancy period required by many carnivorous plants. In fact, the colder the winters the better most of the Sarracenias blossom in the spring.

Using information I had obtained from reading articles about carnivorous plants I attempted to provide the environment that I thought they required. After many failures I discovered that I could not provide adequate lighting and appropriate, seasonal environmental changes needed to keep carnivorous plants happy and healthy while maintaining the artificially high humidity that I believed these plants needed. It wasn't until I placed them outdoors as more common potted plants, and ignored the supposed humidity requirements that I started to have success in growing and

reproducing them. I found that even the more delicate Droseras tend to grow well outdoors in spite of the summer heat as long as sufficient water is provided at all times. While partial shading appears to be beneficial to some species, most appear to thrive without any protection from the sun, even in a location where the sun is intense and clouds are few. Despite what many earlier authors on the subject of carnivorous plant cultivation may contend the need to provide artificially high humidity for many common species seems to have been overemphasized. If the other requirements of light, water, soil, and dormancy cycles are observed, the humidity question seems to fade away, at least in the hot, semiarid environment of inland Southern California.

Are Genlisea traps active? A Crude Calculation

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I find the structure of the Genlisea trap very interesting, although they are not well understood in the botanical literature. Many questions remain unanswered. Are prey attracted or do they just wander into the traps? How is the prey retained in the utricle (the trap's digestive chamber) and how is it digested? How are the digested nutrients retained and then assimilated? With more time and research, these questions will be answered.

The form of Genlisea traps is well known, and I described some of its features in the previous article. In this article I concentrate on a single aspect of the Genlisea trap, an aspect that would seem to be a flaw in the trap's construction. An observation has been made by Juniper, Robins, and Joel in the book, *The Carnivorous Plants* (hereafter JRJ), which may point to the plant's solution to this flaw—namely that the trap is actually active. To complete my conjectures, I present an approximate calculation exploring whether this is plausible.

It seems CP are fairly efficient digestion mechanisms. Dionaea traps allow prey to escape if the prey are too small to be worth digesting. JRJ report that *Drosera erythrorhiza* absorb a full 76% of the available nitrogen in insect prey. Yet consider the fate of a rotifer (to choose a likely nutrient source) swimming along the interior of a *Genlisea* trap. Because of strategically located trap hairs it can only swim towards the utricle where it dies and is broken down for absorption. But what of the chemicals released by the dissolving rotifer, before they are absorbed by the plant? There are no one-way valves at the entrance of the utricle (as there are in Utricularia bladders), and inward pointing hairs have no effect on individual molecules. So what prevents a significant portion of the valuable nutrients from diffusing through the utricle entrance, out of the trap, and away from the plant?

How does Genlisea prevent a wasteful loss of nutrients from the trap? Or does it simply operate inefficiently? JRJ make an observation which may be important (pg. 126). They note that utricles contain not only the digested carcasses of prey, but also particles of dirt. The traps of Genlisea hang downward, so it is difficult to explain how sinking or drifting dirt particles could find their ways into the utricle. After settling into the spiral trap entrance, the particles would need to inexplicably rise into the trap mouth, through the trap tube, and into the utricle. Instead of that unlikely scenario, is it possible these bits of detritus have been sucked into the trap by the plant's effort? Perhaps the plant is expelling water from the trap through the utricle walls. New water from outside the trap would flow up the trap tube to replace the water removed from the utricle. The expulsion would be comparable to the phase in which water is removed from the interior of a sprung Utricularia bladder and is excreted into its surroundings. This is not too implausible since the two genera are closely related and the traps of both genera contain similar internal and external glands. The purpose of this expulsion might be to suck valuable nutrients into the cell walls, and thus prevent their escape from the trap. Genlisea traps may be active and not passive.

I decided to make a few simple calculations to see if it is even wildly possible that a *Genlisea* trap could function as a pump. Could it remove water from its utricle at a

rate sufficient to overcome the molecular speed of nutrients diffusing down the trap tube to the trap bifurcation, and then into open water? Being a scientist, I know that approximate calculations provide insight to basic phenomena. You can get a rough idea of what is going on, or if a mechanism is possible—then let the next group of researchers worry about the details! To treat this problem I needed to calculate two velocities. First, what is the velocity of liquid being sucked through the trap tube to the utricle? Second, what is a typical velocity at which nutrient molecules diffuse out of the trap? If the velocity of fluid up the tube (V_f) is greater than a molecule's diffusion speed (V_d) then the plant could overcome diffusion and thus maximize its efficiency. If you find math uninteresting or paralyzing, skip the next three paragraphs and read the one starting with "I don't expect you...." for the results.

First I estimated the flow velocity through the tube. JRJ note work by various researchers who measured that Utricularia bladders expel about 40% of their fluid volume in approximately 20 minutes. Assuming a spherical bladder 1 mm in diameter, this corresponds to $1.74X10^{-7}$ cm^3/sec of water pumped through its surface area. Some research suggests the glands scattered over the entire exterior surface of the bladders are responsible for removing the internal bladder fluid. Since similar glands are found on the exterior of the Genlisea utricle, it is plausible they remove water from the trap in the same way. Modeling a typical large African Genlisea utricle as a sphere 4 mm in diameter, it would have sixteen times the surface area of the Utricularia bladder and could pump water sixteen times faster. As this water is sucked through the narrow trap tube, which has an inner diameter of about 0.05 cm, it would produce a flow velocity of V_f= 0.0014 cm/s.

And what is the diffusion speed of nutrient molecules through water? This is a little more complicated. A molecule of mass m and at temperature T (in Kelvins) will have a molecular velocity W approximately given by $1/2\ mW^2 = kT$, where k is Boltzmann's constant. For a typical nutrient like the phosphate ion (PO_4^{-3}) at T=25C, $W=2.3X10^4$ cm/s. As this ion races among the water molecules, it will travel only a short distance L before colliding with one. This distance is called the mean free path. (The mean free path can be estimated using $L^3=m/p$, where m and p are the molecular mass and density of H_2O.) The time for a particle to traverse a mean free path is given by $t=L/W$. Because of all these molecular collisions, the ion will not travel in a straight line. Instead it will randomly wander around. It can be shown that after n molecular collisions, the ion will have wandered a distance X from its starting point, where $X=n^{1/2}L$. For it to wander about 1.5 cm (the length of the trap tube for a large Genlisea) the ion will suffer $2.3X10^{15}$ collisions! To wander this distance will take the phosphate ion a total amount of time equal to nt, so I can write the effective diffusion velocity as $V_d=(n^{1/2}L)/(nt)=L/(n^{1/2}t)=W/n^{1/2}$. For our nutrient ion, this gives a diffusion velocity of V_d=0.00048 cm/s.

My velocity calculations were admittedly crude and did not consider a wealth of interesting details. But unless I made a fatal blunder and neglected an important effect, the details that would make these calculations many times more difficult are unlikely to change the results too much. I note for example that I did not treat the effects of intermolecular forces at all. But these forces would only conspire to decrease diffusion velocities, and therefore make the trap even more effective. I think the strongest criticism against my argument is that the methods of water excretion in both Utricularia and Genlisea traps are not understood. In spite of its greater size a Genlisea trap might pump fluid only at the same rate as a Utricularia trap. But still the flow and diffusion velocities would be roughly comparable and the pumping mechanism would be useful for the plant. After all, diffusion is a random process and the diffusion velocity I calculated is only a typical value for a molecule—there will always be faster and slower particles. So the precise value of V_d is not important. For this reason, I am not too concerned with my choice of a phosphate ion as the test particle—V_d is modified only by the square root of the nutrient's molecular mass. I would be very surprised if all my approximations would combine to change the ratio

of velocities I calculated by as much as 100.

I don't expect you necessarily followed that calculation. But the point is the following: simple estimates show that a Genlisea trap may be fully capable of generating a current into its stomach with a speed three times faster than the speed at which nutrient molecules could escape. This tactic would allow Genlisea to extract a greater percent of nutrients from its prey. Perhaps the water-sucking phase of a Genlisea trap only occurs when the trap is signaled by some mechanical or chemical means, analogous to the 20 minutes of water expulsion Utricularia bladders experience after they have been sprung. In fact, a Genlisea would have to draw fluid through its utricle for 18 minutes to completely change the fluid in its tube. It is striking that this is about the same time period as for a Utricularia bladder's water suction phase. Maybe Genlisea swallows!

Finally, while these calculations are interesting and even evocative, they do not prove anything. It might just be that despite any calculations Genlisea is a passive carnivore. Proof must await the laboratory and not the calculator. But an experimental investigation to prove or disprove the hypothesis that Genlisea is active would be relatively easy to perform. Place a chemically killed but structurally intact Genlisea trap next to a live and functioning one. Observations of how quickly dyes migrate through the tubes of each trap should reveal if the live trap is drawing dye into its utricle faster than the dead trap. Unfortunately I have neither the facilities nor the familiarity with biological lab methods to do this experiment to my own satisfaction, so I will leave that job to someone else. Clearly, this is a field of study that is in need of solid experiments for information and insights into the mechanism of this fascinating plant.

CP Paradise in the Bush

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When we first bought our 5 acre block here in Queensland, it was during a severe drought but I could see the remains of dead *Drosera spatulata* here and there. When we moved here, it was after a very wet summer and fall so the CPs were again growing, but this was short lived as the next summer was long and hot with virtually no rain, so the CPs departed again.

This summer had good rain in the latter half, and the fall has also been quite wet, so that the CPs have returned again. The species that has been quickest to recolonise parts of the block has been *Drosera burmanii*, which has established colonies and scattered plants in various areas.

D. spatulata is also becoming obvious again, however, it is a little slower in colonising areas, probably due to the fact that it is a slower grower then *D. burmanii* . *D. pygmaea* is also present, but much harder to find due to it's smaller size.

I have also found my first plant of *Byblis liniflora* for this year, as I had not seen it here for about two years due to the drought. It seems to only grow during very wet periods. The same can be said for *Utricularia lateriflora*, which can only be found after the ground becomes really waterlogged.

I am able to find scattered clumps of *U. lateriflora* in various areas, and most are rather small plants with small off-white flowers. However, I recently found a large form of this species that has purple flowers around the same colour as *U . dichotoms*. At first I thought it was this latter species, until I took a closer lock.

The flowers are approximately twice as big as the smaller form, on scapes four times us long. The leaves appear to be around 1 1/2 times the size of the smaller form.

I've also again found what appears to be a tiny annual species of Utricularia, with a minute purple flower about .5 mm on a scape only a few millimeters long. It is extremely difficult to find, and you have to be in the right place, and specifically looking for it, in order to find it.

Most of our block is left as natural bushland, with only areas near the house and

around the boundary being mowed. On some parts of the boundary, *D. spatulata* and *D. burmanii* grow, and I have noticed that after I mow, the tentacles of these plants bend over the small particles of dirt and grass that land on the leaves..

It would appear from this reaction, that the plants gain some nutrient from this debris that lands on them during the mowing process. After rain or when new leaves grow, the plants return to their usual appearance until the next time I mow when the same reaction again takes place.

The last species of CP to be found here on our block is a tuberous species, which is either an undescribed species or a close relative of *D. peltata*. This species in unusual in that it grows in the late summer and fall, with the coming of the rain, and it flowers quite early in the year. Most tuberous Drosera are winter growers, so this one is quite different in it's growing season.

The appearance of this species is very similar to *D. peltata*, with several differences. For one thing, it seldom forms a basal rosette, except for seedlings and smaller plants. The colour of the plants is usually a bronze colour, with plants tending to reddish or greenish depending on growing conditions. The plants can be short and upright, or long and straggling, the latter form being more common in long grass. The petals are white, and the sepals are smooth with a hairy margin. The ovary is a reddish brown colour. The plants we have here are very similar to those described as *D. peltata* "white petal/orange ovary" by Robert Gibson in the Australian CP journal of Vol 12 no. 4, December 1993, pp 15,16. However, the plants here have larger petals than these shown in Robert's drawing on page 15.

Carnivorous Plants of the Esperance Region, Western Australia

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The following is an account of the twenty-seven carnivorous plant species found during a five day expedition to the Esperance region of southern Western Australia in late October, 1992. The expedition was organized by Robert Gassin of Melbourne, who was accompanied by Sean Spence, Brian Denton, Fred Howell and myself. Sean, Robert and I drove from Melbourne to Adelaide where Brian and Fred joined us on the long drive to Esperance. We spent 4 days at Cape Le Grand National Park and also visited the adjacent Cape Arid National Park. We then camped at Fitzgerald River National Park for one night before investigating the surrounding area and commenced our trip home, armed with observations of abundant carnivorous plants in their natural environment.

A range of different environments supporting carnivorous plants was encountered during this expedition. In the Cape Le Grand area, wooded granite or laterite hills and margins rose above wooded to heath-covered coastal plains. The latter are studded with swamps and freshwater lakes, in which carnivorous plants abounded. To the east, in the Cape Arid area, drier coastal heath and woodland occurred, with fewer granite hills and wetlands, supporting fewer carnivorous plant species. In the woodland and heathland of the Fitzgerald River N.P. a surprisingly low number of carnivorous plant species were found, although this included 3 *Drosera* species not found elsewhere. Overall the area explored contains few streams of significant size, but the coastal area contains a surprising number of freshwater lakes and swamps. During the preceding months prior to our visit, the region had received an unusually high rainfall.

The twenty Drosera and seven Utricularia species found during the expedition are outlined below, with details of their habitats.

Drosera ericksoniae

Drosera ericksoniae was found in only one location, in the northern end of Fitzgerald River National Park growing in damp, sandy soil 3 to 6 metres from a small

creek in open woodland. Nonflowering, or fruiting, rosettes up to 2 cm diameter, were initially thought to be a robust form of *D. nitidula* ssp *nitidula*. This pygmy Drosera has not previously been recorded in the literature for this area.

Drosera glanduligera

Golden green rosettes of *D. glanduligera*, to 4 cm diameter, were found in all three National Parks and adjacent areas and grew in a number of different environments. In the Cape Le Grand area this winter-growing annual was found on the slopes of rounded granite hills, especially in thin wet soil on bare granite slopes. It was also found in creek beds, on the sandy flanks of granite hills and in disturbed areas of flat, damp sandy coastal heath. In Cape Arid N.P. this species was infrequently found in low coastal heath adjacent to a sizable wooded swamp as well as in the wetter parts of roadside drainage ditches. In Fitzgerald River N.P. it was found in wet sandy soil adjacent to creeks, in open heath, under low woody shrubs, beside the road and scattered in mallee woodland north of the park. The plants were in a range of growth stages according to the availability of water. Nonflowering, flowering and fruiting plants with live rosettes occurred in wet areas, whereas fruiting plants with dying or dead rosettes occurred on dry thin soils, particularly on granite hills. Plants produced up to 5 glandular scapes, each with up to 10 orange flowers, however, open flowers were only seen at two locations. A slightly different form of this species was found in a small area north east of Cape Le Grand N.P. which had distinctly pale orange flowers.

Drosera grievei

The first carnivorous plant we encountered in Western Australia was a pygmy Drosera which grew in a colony in a dry sandy depression amongst scattered, low-growing herbs, in a woodland clearing, approximately 150 km north of Esperance. The red-rosettes grew up to 1.5 cm diameter and had circular red lamina on green petioles which widened distinctly toward their base. The plants formed stems, to 1 cm tall, and a few of the larger individuals had hairless multi-flowered scapes to 4 cm tall, with up to 15, or so, white-petalled flowers.

In the field these plants were tentatively identified as *D. paleacea* ssp. *paleacea*, but they occurred a significant distance east of their published range (Lowrie, 1989). On closer inspection of the photographs taken at the time, it is more likely they are the recently described species, *D. grievei* (Lowrie and Marchant, 1992).

Drosera huegelii

Drosera huegelii was infrequently found in all three national parks, often in localized clusters of a few plants. In all cases the plants were found in dry-surfaced sandy, or stony soil, amongst low woody plants, or small trees, typically away from swamps or creek beds. This erect, tuberous species, to 30 cm tall, was instantly recognizable by its bell-shaped cauline leaves. Only plants seen in the Fitzgerald River N.P. still had bedewed glandular, orange-brown leaves and only one or two plants were found with seed capsules. In other areas the leaves had just begun to senesce.

Drosera leucoblasta

Drosera leucoblasta was found in Cape Arid N.P. and also in a disturbed area of dry woodland about 100 km north of Esperance. In both locations this pygmy Drosera grew in dry-surfaced sandy, or stony, soil in open areas between woody plants or in greater abundance in cleared areas, such as roadside gutters. The golden green rosettes grew to 2 cm diameter, with a prominent silvery stipule crown and supported up to 3 scapes. These grew to 10 cm tall each supporting up to 8 flowers. The 1 cm diameter flowers were open only in the morning and had vibrant orange petals.

Drosera lowriei

Rosettes of *D. lowriei*, to 3 cm diameter, were found only in a small valley in Fitzgerald River N.P. Many rosettes were still bedewed and a vibrant red colour, although some in drier soil had begun to die down. The plants occurred in abundance in saturated coarse sandy soil adjacent to the creek, with many rosettes under a thin film of clear water. Several rosettes had one to three ripe seed capsules full of spherical seed. This tuberous species had not been reported in this area before and was a

surprising discovery.

Drosera macrantha ssp. macrantha

Drosera macrantha ssp. *macrantha* was found in all three national parks, and in dry woodland west of Esperance. It was particularly abundant on the granite slopes in Cape Le Grand N.P. where it grew in damp thin soil around granite exposures and also the surrounding woodland, often away from other Drosera species. This climbing tuberous Drosera was easily identifiable by its leaves, in groups of three and retentive glands on the upper part of its stem. Plants grew up to 1.6 m long and were orange in colour. Many plants were setting fruit and had white-petalled flowers, but no open flowers were found. The remains of dormant plants were found on granite hills and air dry woodland in the other two National Parks where it was uncommon.

Drosera menziesii ssp. menziesii

This erect or scrambling tuberous Drosera was found primarily in Cape Le Grand and Cape Arid National Parks and the area in between. It grew in abundance around bare granite hill slopes and in coastal heathland. The red stemmed plants, many of which were in flower at the time of our visit, grew 10 to 40 cm tall. The sweetly-scented pink-petalled flowers are up to 2 cm diameter but only open in the morning to early afternoon on sunny days. Mass flowering can occur, which makes locating plants very easy, even from a moving car. Juvenile plants produced a red rosette, to 1 cm diameter and often lacked an erect stem. In coastal heath this species was found in damp, peaty sand, often around the edge of lakes, or in small depressions. The majority of plants were still in active growth.

Drosera modesta

Only one plant of the tuberous, climbing, *Drosera modesta* was found on the expedition. This nonflowering plant grew in woodland in a shallow valley in the Fitzgerald River N.P. I did not see this plant but Sean and Robert and reported it was 20 cm tall, with alternately arranged cauline leaves, and had just started to die down. It grew in a sheltered position near plants of *D. prostratoscaposa*.

Drosera neesii ssp. neesii

Drosera neesii ssp. *neesii* was found growing only in and around Cape Le Grand N. P. in damp to swampy areas of coastal heath. This golden-green tuberous Drosera produced erect stems to 30 cm tall, with shield-shaped cauline leaves. The plants in this area have pink-petalled flowers and ovaries which lack glandular hairs, whereas those around Albany, 350 km to the west, have pale-yellow flowers and are thus more typical of the plants of this species illustrated by Lowrie (1987). In the past these two forms have been classified as different species, *D. neesii* and *D. sulphurea* respectively (Erickson, 1968). The sweetly scented pale-pink flowers, up to 2 cm diameter, were open from morning to mid-afternoon. It was often found with *D. menziesii* ssp. *menziesii* around lake margins, extending into soils apparently too damp for the latter species. Its requirement for permanently damp soil appears to limit the range of this species.

Drosera nitidula ssp. nitidula

Drosera nitidula ssp. *nitidula* was only found in two locations in and near Cape Le Grand N.P. This locally common pygmy Drosera grew in discontinuous bands in moist sandy soil 1 to 4m from the edge of small lakes, amongst herbs and low woody plants. Many plants had multi-flowered-scapes, but the white-petalled flowers only opened in sunny conditions.

Drosera microphylla

Drosera microphylla was only found on the granite slopes of Mt. Le Grand, in Cape Le Grand N.P, where runoff was concentrated. Here this tuberous species occurred abundantly, and its erect, red stems and leaves turned patches of the granite slopes red. Its stems grew to 30 cm tall, surmounting a basal rosette to 2 cm diameter. Many plants were showing signs of commencing dormancy and only a few were flowering. Flowers open in the early morning and are usually white. One plant, however, had pale-pink petals with a darker pink base. In general, this species grew apart from all

other carnivorous plants species, with the exception of a few *D. menziesii* ssp. *menziesii* plants which shared some patches of thin moss-covered soil. A few plants also occurred on the down-slope edge of a large rock and sand lens on the granite slopes with *D. pulchella.*

Drosera occidentalis ssp. australis

Drosera occidentalis ssp. *australis* was the smallest, most numerous and widespread species of pygmy Drosera found in the expedition. It occurred in all three National Parks, and adjacent areas, but was generally limited to places where water was available for at least its growing season. It was found in creek beds of ephemeral streams on the flanks of granite hills, often amongst woodland, on top of rock and sand lenses on hill slopes and abundantly in the wetter parts of coastal heaths, swamps and lake margins. The red rosettes were up to 1 cm in diameter and supported several single-flowered scapes 2 to 3 cm tall. The white-flowers only opened for a short time on sunny days. In some situations the rosettes grew in shallow water, or in the shade of a dense cover of sedge and scattered shrubs in swamps, but were more often found in open, partially shaded conditions, in moist soil in roadside gutters or coastal heath.

Drosera paleacea ssp. trichocaulis

Drosera paleacea ssp. *trichocaulis* was found in coastal heath and woodland north of Cape Le Grand N.P, in coastal heathland in Cape Arid N.P., and recently burnt woodland in the Fitzgerald River N.P. This pygmy Drosera resembled *D. grievei* in many aspects but had an unmistakably hairy scape. The locally common plants grew in moist, but well-drained, sandy soil, generally several metres away from and higher than, the nearest lake or swamp. The white flowers opened on sunny days, often opening en masse.

Drosera prostratoscaposa

Drosera prostratoscaposa was found at its type area in the Fitzgerald River N.P. Eight rosettes of this tuberous Drosera were found. These were up to 7 cm diameter and either still bedewed or starting to die down. They grew in dry-surfaced, coarse-grained sandy soil in a small wooded valley with several plants of *D. glanduligera*. There were no signs that any had flowered.

Drosera pulchella

Drosera pulchella was only found in a few, conspicuously wet sites, in and near Cape Le Grand N.P. The mostly green rosettes of this pygmy *Drosera* were up to 2.5 cm diameter. They were found in peaty sand in the wettest parts of creek banks and the lower slopes of rock and sand accumulation on the northern flanks of Mt. Le Grand, but were more abundant in lowland coastal swamps. In the latter, it occurred in either open heath, commonly under a few centimetres of clear water, or in the shade of sedges and scattered shrubs in coastal swamps. It was also locally common on the margins of freshwater lakes. Only in one area were plants found in scape, but the pink-petalled flowers were not open due to the cloudy conditions. This species often grew with *D. occidentalis* ssp. *australis*, and less commonly with *D. menziesii* ssp. *menziesii*, *D. neesii* ssp. *neesii*., *D. microphylla*, *U. menziesii, U. tenella*, *U. violacea* and *U. westonii*.

Drosera pycnoblasta

Drosera pycnoblasta was found in only one location, on the dry floor of a shallow valley in open woodland approximately 200 km west-north-west of Esperance. The pygmy Drosera rosettes grew up to 1.2 cm diameter, surmounted by a very prominent rounded silvery stipule bud. Mature plants had developed short stems, to 1 cm tall and supported up to 2 scapes. Each multiflowered scape, to 10 cm tall, bore sweetly-scented white-petalled flowers to 8 mm diameter. The flowers were notable in that they lacked the red basal spot on the petals and had five styles, not three, thus differing from the plants illustrated by Lowrie (1989).

Drosera sargentii

This newly described taxa covers the *D. parvula*-like pygmy Drosera population of the Esperance district (Lowrie and Marchant, 1992) (Lowrie, 1989, p 134).

Nonflowering rosettes of this species were found in dry-surfaced, sandy soil in open low coastal woodland and heathland. They were up to 2 cm diameter, with red, rounded leaves and a relatively tall, and prominent silvery stipule bud.

Drosera scorpioides

Drosera scorpioides was found in Cape Le Grand N.P. and two areas of dry woodland north and west of Esperance. This distinctive, large pygmy Drosera has golden green leaves to 2.5 cm long held in an open rosette, often on a thin stem up to 10 cm tall. Plants may develop additional growing points on this stem and one notable plant had eight of these. A few plants had open, white petalled flowers, however, most mature plants had finished flowering at the time of our visit. This species grew only in conspicuously dry-surfaced sandy or pebbly soil, often several metres above and away from the closest water or damp soil. It often grew with *D. sargentii*, *D. huegelii*, *D. macrantha* ssp. *macrantha* and, rarely, *D. menziesii* ssp. *menziesii*. The plants grew in relatively open conditions, amongst scattered herbs and rare low woody plants.

Drosera zonaria

Drosera zonaria was found in open woodland or coastal heathland in all three National Parks and at one site west of Esperance. The rosettes of this tuberous Drosera grew in scattered clusters, typically in the shade of shrubs. It occurred in moist to dry-surfaced well-drained sandy soil, generally away from lakes or creeks. The green or yellow-red rosettes were up to 5 cm diameter and either still bedewed, or in varying stages of dying down. No rosettes had the remains of finished scapes. There were few insect remains on the bedewed plants, possibly due to the paucity of insects or the trapping inefficiency of the leaves.

Utricularia australis

Sparingly branched stems, to 15 cm long, of the aquatic *U. australis* were found only in two permanent lakes, both just north of Cape Le Grand N.P. They had bifurcated, much divided leaves bearing green bladders to 3 mm long and the typically bushy, non-curled growing point of this species. No plants were in bud, flower or fruit. This species grew amongst reeds and *Melaleuca* trees which emerged above the lakes surface. *Utricularia volubilis* also grew in one of the lakes, which had *U. tenella*, *D. pulchella* and *D. occidentalis* ssp. *australis* around its margin.

Utricularia benthamii

Utricularia benthamii was found only in and around Cape Le Grand N.P. in swampy areas of coastal heath and flooded swamps. Each plant had up to two single-flowered scapes to 15 cm tall, which rose above a cluster of filiform leaves, to 2 cm long, and 2 mm long traps on short green stolons. The solitary flower had a small white, two-lobed upper lip above a larger, incipient three-lobed lower lip which was lilac in colour save for an orange-yellow palate edged in dark purple. This annual was found in deeper ponds in a few drainage ditches and the swampy margin of a lake in coastal heath, where it grew with *U. violacea* and *D. occidentalis* ssp. *australis*. However it was most prolific in a permanent swamp covered with water to 10 cm deep and grew amongst *Melaleuca* shrubs less than 1 m tall. In the last setting it grew with *U. westonii* with *U. violacea*, *U. tenella*, *D. nitidula* ssp. *nitidula*, *D. menziesii* ssp. *menziesii* and *D. neesii* ssp. *neesii* on the swamp margin. The majority of flowers had produced seed.

Utricularia menziesii

Utricularia menziesii was found in and around Cape Le Grand N.P. where it grew both on the slopes of granite hills and in wet areas of coastal heath. On the flanks of Mt. Le Grand this perennial grew in thin saturated sandy soil around large bare granite areas or more rarely in sandy soil in a creek bed, in association with *D. glanduligera*, *D. menziesii* ssp. *menziesii*, *U. tenella* and rarely *D. occidentalis* ssp. *australis* and *D. microphylla*. In the low elevation coastal heath this species grew around numerous lakes in water up to 10 cm deep and up to 2 m from, and 20 cm above, the lake edge. It also grew in less abundance in moist soil in coastal heath, often with *U. tenella*, *D. neesii* ssp. *neesii*, *D. occidentalis* ssp. *australis* and *D. pulchella*. Although

the single-flowered scapes produced by many of the plants had died, the cluster of red, rarely green, leaves and traps was still alive and stood out from the peaty soil. Given the abundance around the granite outcrops and lakes, these plants must put on a stunning show throughout winter when they are in flower.

Utricularia tenella

Utricularia tenella was found in all three national parks and the area around Cape Le Grand N.P. and was the most widespread Utricularia seen on the expedition. This may be attributed to its ability to survive in drier environments than the other Utricularia species. In Cape Le Grand N.P it was found in thin wet soil around the edge of the bare granite flanks of Mt. Le Grand as well as lake margins and roadside drainage ditches in the coastal heathland. In many of the latter situations the soil surface was distinctly dry but the plants were still in flower and fruit. It was found in a similar environment in Cape Arid N.P. where it commonly grew with *D. glanduligera*, *D. menziesii* spp. *menziesii* and *D. occidentalis* ssp. *australis*. In Fitzgerald River N.P. robust white-flowered plants and the typical pink flowered plants grew in moist soil in a small valley, in the company of *D. glanduligera* and *D. lowriei*. The flowers of this annual have a distinctly three-lobed lower lip and up to three were supported on the one or two scapes which rise up to 15 cm from the neat cluster of leaves and traps. The majority of flowers were pollinated and this species produced an abundance of small, spherical seeds at the end spring.

Utricularia violacea

Utricularia violacea was found only in wet coastal heath in and around, Cape Le Grand N.P. always in small numbers. This winter growing annual produces a single flowered scape to 10 cm tall above a small cluster of traps and leaves. The small flower has a purple, notched upper lip and a larger purple lower lip with dark purple edged low white and yellow palate ridges. The majority of flowers of this winter-growing annual were pollinated. This species grew on the edge of lakes and flooded swamps, beside ponds in roadside gutters, in some moist creek banks and moist depressions where it was found in the company of various combinations of *U. tenella*, *U. westonii*, *U. menziesii*, *D. pulchella* and *D. occidentalis* ssp. *australis*.

Utricularia volubilis

Utricularia volubilis is a robust, mostly-submerged perennial species which was found only in two permanent lakes in and around Cape Le Grand N.P. It grew in water 10 to 70 cm deep, on the bed of which it has a loose cluster of green or red filiform leaves to 20 cm long, each terminated in a green or black bladder to 3 mm long. A single scape grew from the centre of each plant and grew erect until it neared the waters surface. From here it began to spiral vigorously anti clockwise and twined up adjacent emergent sedge leaves and other *U. volubilis* scapes. Each scape terminated in two, three or four large purple flowers which were born dichotomously or singularly. The flowers have a small, erect white upper lip and a large purple lower lip to 2.5 cm wide, the central palate ridges of which are yellow, edged darker purple in colour. At the time of our visit the plants were at the peak of flowering and had only just started to set fruit.

Utricularia westonii

Utricularia westonii was found only in and around, Cape Le Grand N.P. However, it was locally common in lake margins and edges, beside ponds in roadside gutters and in damp depressions in the coastal heathland. It grew in water up to 20 cm deep, as well as moist sandy soil. Up to three scapes were produced above the neat, typically red cluster of leaves and large (5 mm long) traps. Scapes of this species grew to 30 cm tall and had up to five pale pink flowers. The majority of spent flowers of this annual had been pollinated and ripe seed was beginning to be shed at the time of our visit. This species was commonly found with *U. violacea*, *U. benthamii*, *U. tenella*, *D. occidentalis* ssp. *australis* and *D. pulchella*.

The area covered in this expedition had the potential of yielding even more carnivorous plant species - *D. erythrorhiza* ssp *erythrorhiza*, *D. ramellosa D subhirtella* ssp. *subhirtella*, *D. subhirtella* ssp. *moorei*, *D. platypoda*, *D stolonifera* ssp. *compacta*,

U. dichotoma and *U. helix* were known to occur there (Lowrie 1987, 1989; Taylor, 1989) but were not found. However the 27 species we observed in the wild was an amazing experience which made the expedition unforgettable. It was also interesting to note the environment in which each species was found, which should assist in the cultivation of these amazing plants.

ACKNOWLEDGMENTS:

I wish to thank Robert Gassin for arranging this unforgettable expedition, and providing transport. I also wish to thank Robert Gassin, Sean Spence, Fred Howell, and Brian and Matthew Denton for help with this article.

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CATTLE AS SARRACENIA STEWARDS?

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Behold the cow. From an anthropocentric view it stands there with a rather placid and bored facial expression as it nibbles forage or chews cud. Its weighty and ponderous body is balanced on four relatively small hooves that thus bear tremendous weight on each hoof that is transferred to the ground as it lumbers about the pasture, seemingly crushing all beneath those hooves. Appearing to eat everything green in sight, large quantities of nitrogenous waste products are passed very frequently. Due to its fermentative digestion, we are told that each cow passes significant quantities of methane that contributes to the greenhouse effect.

Not something you would want in your sarracenia patch, you say? Well, think again, maybe.

Stewards care for things. In terms of sarracenia bogs and savannas that are preserved by various conservation agencies, public or private, stewards are appointed either as volunteers or employees to provide security, and to actively work on the land to prevent any further deterioration that may have begun, or perhaps to reverse a decline. Those of you who have read my comments on this regularly have seen me praise the conserving agencies generously, but frequently criticize resulting stewardship which may very well be out of the original conserving agency's hands. Whether stewards are volunteers or are paid, once a responsibility is undertaken we all expect some knowledgeable activity because each preserve has its point below which it may well never recover to even the level at the time of conservation.

Let us look at two plots of land. One is privately owned and the owner wishes to do anything he can to get rid of the sarracenias on his land. The other piece of property has not been so attacked, in fact it has been under "management" for several years to preserve sarracenias, has just recently been purchased by a highly respected conservation group, and yet it is declining at an alarming rate in spite of all this love.

Our first piece of land is located in Toombs County, Georgia near the town of Lyons and in the famous Vidalia onion country. It is on a small family farm located on an obscure sideroad that parallels that historic north-south artery, US 1. The owner has an economically wise mixed approach to his farm with various crops and some beef cattle.

As one approaches his cow pasture on the road, the sight pictured in Figure 1

greets you. At one sloping corner of his cattle pasture is a very large yellow blur inside his fence that turns out to be healthy masses of shoulder to shoulder *Sarracenia flava* and associated CP. The area approaches two acres of his pasture at this lower corner and further observation confirms that this is a typical middle south Georgia seep slope. The first time I saw this 16 or 17 years ago, I pulled the car over and got out to take some photos from the roadside. A battered pickup pulled over and a man who proved to be the farmer got out. Someone taking pictures of his pasture comes under the heading of suspicious in that part of the country. After all, I could have been an IRS agent or a potential developer who wanted to asphalt his whole farm. If you do field work, you live and flow with these attitudes to get along. I explained that I was interested in the fantastic show of the plants on his property.

Rather than expressing some pride in them as I have had many property owners do, he scowled and explained that he wanted to get rid of every blasted one of them because the cows obviously did not eat them, they kept the spot wet (his concept) and there was little grass where they were so they were reducing pasturage for his cows. I looked over the barbed wire at cattle widely spaced in the pasture, some standing around in the sarracenias, not doing anything in particular, certainly not eating the pitchers. I asked him if he had ever seen cattle eat the pitchers. A few were bent or askew where the cattle had walked through them, but the narrow passage their legs and hooves required seemed to do little lasting damage judging by the healthy crop of plants I saw. No, he said, they do not eat the pitchers. A few younger calves sniff at them or try a nibble, but as they grow older they seem to learn that pitchers are not forage. However, he and I had both seen cattle nuzzle down between plants and eat grasses and weeds, thus doing some effective weed control.

I asked him what he had tried to improve his pasturage. He tried to burn them in all seasons, but that seemed to make the plants "worse".

He tried mowing them in various seasons with a similar result. Initially, of course, he had let his cattle loose in them, but the sarracenias flourished, and he felt they were

Figure 1— A fine stand of *Sarracenia flava* in a seep slope pasture alongside a back road in Toombs County, Georgia.

Figure 2— *S. rubra ssp. jonesii* in a stand near Etowah, NC. Note decline with abundant grasses and other weeds after exclusion of cattle.

getting still "worse". I silently hoped he would never spray, or try channeling the slope drainage and plowing. So far, he has not.

After a few more pictures, I left him with a puzzled expression still on his weathered face. Whenever I am in that part of the country, I drive by the location, and over the years the sarracenias have continued to do very well. I never spoke with the owner again, and possibly heirs have the farm by now. The last I saw the place about four years ago, the same startling yellow blur of pitcher plants was still there.
Clearly, the cattle were not doing physical damage at all. A possible degree of fertilization did not seem to bother the sarracenias, nor did compaction from cattle hooves. They did not forage on the pitchers although a few tentative nibbles may have convinced the cattle of the pitchers' sour taste to a cow. And the cows weeded— Browsing whatever other palatable forbs that would begin to grow between the pitcher plants. As is more usual than not, the whole pasture, including the grassy part, was overgrazed, and the cattle would wander onto the seep slope looking for whatever might be growing between the pitcher plants.

In this particular set of circumstances, the cattle could not have been making a better contribution than if they were trained and paid for it!

Now let us travel several hundred miles to the north, into the mountain plateaus of southwestern North Carolina, near the crossroads of Etowah just a few miles west of Hendersonville— *S. rubra ssp. jonesii* country! The name alone quickens the heart of the sarracenia field botanist.

In this general area, Dr. Edgar Wherry traveled in the 1920's and 30's and described several bogs of this plant. In later years he revisited the same areas and noted how most of them had been handily converted to golf courses, potato farms and at least one major appliance factory. This prompted Dr. Wherry to write me that it was ill advised for an older botanist to return to former favorite field sites because he or she will almost always be disappointed. How right he was!

But, near one of these destructive golf courses where he saw plants off the main highway, there is on a back road a small farm that for years held the best overall remaining location for jonesii. It is also one of the two sites I know of for the green pitchered/yellow flowered variant.

The site is in a property line fenced corner of a pasture and is a seep slope. Above this lower, wetter corner, is continuation of cattle pasture, and above that, croplands. The little location is no more than a quarter or third of an acre, but what a beauty it was.

I was first led to the location close to twenty-five years ago by a very active, elderly retired gentleman who field botanized for a hobby. He had retired to Hendersonville from scientific instrument sales work in New England, and I do not remember how we connected, but we botanized for a number of years after. At that time, the bog held the two variants of jonesii, along with *S. purpurea* and hybrids between the two. It was an amazing sight—Large clumps of the pitcher plants had little space between them. The pitchers were fine, tall specimens and flowering was dazzling each spring.

And there were cattle. They freely grazed the entire pasture including the bog. Again, as in Toombs County, Georgia, the cattle did not eat the pitchers and did little mechanical damage to them outside of a few pitchers bent over. In fact, Fred Case and I separately suggested that the cattle might actually contribute to vegetative proliferation by breaking the horizontal rhizomes that lie just beneath the ground surface. This is a recognized technique for propping in culture.

At any rate, there were the cattle, nibbling and "manicuring" the grasses and weeds down, and the plants were doing great. I visited the site several times over those early years and it stayed about the same. The farm was in private hands and the owner seemed to have a benign attitude toward the pitcher plants, then some pride when he received more and more attention over them.

The first move was an attempt at management. It must have seemed reasonable to someone that the cows could do more harm than good, or were not even neutral, so

barbed wire was strung diagonally across that corner to fence the cattle out. The cattle did not mind, but I think the pitcher plants did.

Decline began rapidly. Figure 2 shows a typical part of the area close up and you can see the abundant grass and weed growth and smaller clumps of plants a couple of years after the diagonal. To be fair, the adjacent deciduous trees on the lower and north fence line also grew and their branches spread over the bog causing more shading of part of it, but the open part began to recede more and more towards the lower shaded part.

Then the farm was purchased by a reputable private conservation organization. The only change was a few stakes driven into the ground to act as baseline survey markers for counting the fewer and fewer plants. It was suggested that old farming practices of applying fertilizers and other chemicals to the higher ground had tainted the lower bog corner and this was depressing pitcher plants, but the same practices had been in place for years when I first saw the bog and all through the time I knew it until the cattle were excluded.

Some well trained botanists and ecologists with the conservation organization and the US Fish and Wildlife Service are looking into it. They say they "have not quite got a handle on the continual decline" of this once magnificent stand. When they said that it suddenly occurred to me how old I was and how young these well trained people were. In several areas of this one State alone, they were "saving and managing" areas that excited them but that in actuality were mere faint shadows of the former glory of pitcher plant bogs in years past. Perspective is important.

There, then, is a tale of two bogs. One persisting in spite of mighty efforts by an owner to destroy it, another withering in spite of thoughts to save it. Do I advocate letting the cattle back into that mountain farm bog? Hardly. This bog survived for probable millions of years before farms and herded cattle, but the forces molding the bogs then were probably in parallel to what the cattle did to help them in these more recent times. Maybe the bored, placid cattle are trying to tell us something.

Literature Review

Gardner, Rob. 1994. Growing carnivorous plants at home. Newsl. NC Wild Flower Preservation Soc. 6:1 1-13.

Rob Gardner is a highly skilled grower of plants and is a curator at the North Carolina Botanical Garden. In this brief article he introduces sarracenias, and then describes his experience and suggestions for growing these plants outdoors. Since this is a State Society directed bulletin, the instructions aim mainly toward that state's milder climate. (Outdoor artificial bogs ranging tom sunken wading pools to holes lined by plastic sheeting, along with soil light and water recommendations are described.

Sheridan, Phil. 1991. Noteworthy collections: Maryland. Castanea 56: 71-72.

Phil (along with Bill Scholl) has made some unusual plant discoveries in Maryland, among them the following CP: *Sarracenia purpurea* (first collection from Charles County and western shore), *Drosera rotundifolia* (declining populations) and *Drosera capillaris* (one of more northern extensions of this species).

Sheridan, Philip M. 1993. 1) A unique habitat for *Drosera rotundifolia* L. (Droseraceae) on the Blackwater River, Virginia. 2) The Virginia pitcher plant bogs, part one: Poo Run. Virginia Journal of Science 44:
122. (Abstracts).

In abstract 1) above, the author describes *Drosera rotundifolia* on two vertical clay seepage's on the Blackwater River. Bends in the river result in erosion with water seeps flowing from between the upper sandy layer over wet, impermeable clay. This seep provides excellent habitat for the sunned. In abstract 2), the author recounts the history of Poo Run, a floristically significant wetland located near Petersburg, VA. It

contained the largest stand of *Sarracenia flava* recorded in Virginia, near the species' northern limit. Burning by Native Americans and early settlers helped maintain the bog. The Battle of Petersburg (American Civil War) and clearance of right of way by early railroads (steam with accidental fires!) also maintained the bog. A shift away from Steam and to fire prevention caused significant woody encroachment. The site met its demise with construction of I-95.

Strong, Mark T. and Phillip M. Sheridan. 1991. *Juncus caesariensis* Coville (Juncaceae) in Virginia peat bogs. Castanea 56:65-69.

In widely scattered boggy seeps in eastern Virginia kept open because they occur in power line right of ways, the rare rush mentioned above can be found. Among CP that may occur with it are *Sarracenia purpurea*, *Drosera capillaris*, *D. rotundifolia* and *D. brevifolia*.

Teo, Chris KH. 1994. In vitro germination and pitcher formation in Nepenthes. Nature Malaysiana 19:24-29.

In this article, the Malaysian author describes his experiences growing nepenthes seeds from his area in various flask culture situations. He has had very good success. Using unopened but nearly mature seed pods, he felt at first that surface seed sterilization was riot necessary. Most flask growers use a dilute chlorine bleach solution to sterilize seed surfaces so that various fungi and bacteria will not contaminate the agar surface. While he had no contamination, most seeds turned brown or black and failed to germinate, the discoloration being due to accumulation of phenol compounds. After treating the seed with bleach, darkening no longer occurred and he achieved germination, so the bleach served another purpose besides sterilization. In the article, he describes stages of embryo and plant growth in the media and this is liberally illustrated by color photos.

U.S. Fish and Wildlife Service. 1994. Draft revision green pitcher plant recovery plan. U.S. Fish and Wildlife Service, Jackson, Mississippi. 35 pp. (For information on purchasing copies, call 1/800/582-3421 (Maryland)).

The USFWS is required to put out and periodically update recovery plans for listed endangered species, and this is the third, March, 1994 update for *Sarracenia oreophila*. Currently, there are 35 known locations for this species, ten having been "discovered" through discussion with local peoples since 1980. There is one site in northeastern Georgia, two in southwestern North Carolina, and the rest are in northeastern Alabama. Regarding preservation of sites, only three are owned by The Nature Conservancy, three are on Alabama State Park property, and twelve are on private lands and are part of a conservation agreement with the current owners, but are far from secure, as the remainder are not.

Numbers of plants vary from 1 to 500 "clumps" (growth points) per site, but since growth is rhizomatous and one rhizome may have more than one growth point, genets are not known.

This new revision makes interesting reading since it is a fair summary of the history and biology of the species as well as intended plans for recovery. It is felt that if eighteen of the sites can become biologically secure with healthy, growing, reproducing populations, then recovery can be claimed and the species delisted. However, the timetable for this is uncertain, perhaps a minimum of ten to fifteen years if all goes well.

All is not going entirely well. While it is of the opinion of some observers that overall the species seems to be holding its own or the situation getting no worse, it has been fifteen years since listing and little forward progress has been made aside torn location of additional sites. Attempts at plant reestablishment by transplant of adult or seedling plants at several sites have failed miserably, probably due to poor planning and preparation as well as choice of site. The general level of seedling activity at all

sites is very poor, and pollination does not seem as effective as other species of Sarracenia. Insect destruction of flowers and seedpods is felt to be no worse than with other species elsewhere.

After all this time, efforts at hydrologic studies and recovery are finally being considered seriously for the first time, which is an acknowledged new primary emphasis! Further studies on pollination, seedling establishment and closer census of sites with mapping of each plant will be undertaken.

The report is generally good reading. There are several typos that presumably will be corrected. Unfortunately, some questionable opinions and little more than old rumors are repeated as though solid science. Glancing through the references, the list is far from complete for useful material, and contains reference to at least ten 1-10 page privately commissioned reports to which the public does not have access. Unfortunately, many of these seem to be key bases from which specific "tasks" are derived and yet contents are not available to other serious students to offer support or useful counter-comment.

SPECIAL NOTICE

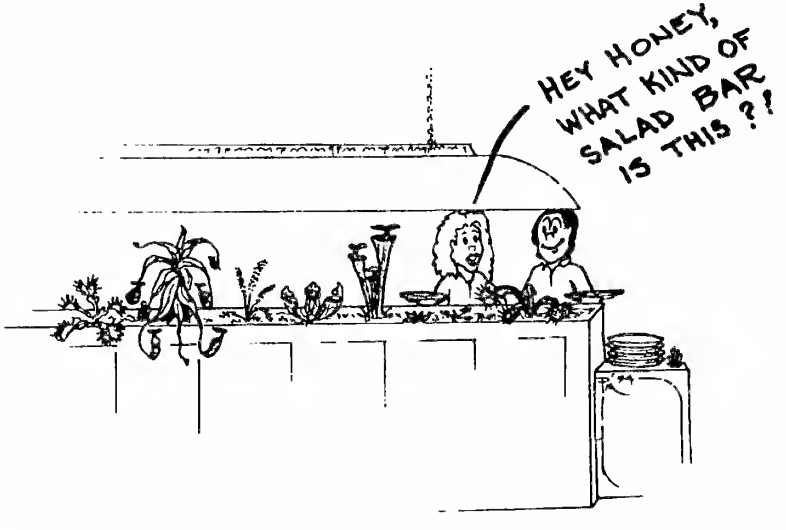
NEW PRICES FOR BACK CPN ISSUES

Over the years, we have accumulated a large inventory of back issues of CPN magazine which is becoming a serious storage problem. So, we are making a generous offer to reduce this inventory by reducing the prices of ten years of the past issues.

CPN issues from 1978 to 1987, (vol 7 to vol 17) will now cost $8.00 per volume, a discount of over 60% from the previous price. Now this offer only applies to the above mentioned issues because the CPN issues from Vol 18 to vol 22 remain the same, i.e. $12.50 per vol. Issues of CPN from Vol 1-6 are available on demand since these are copied from the original issues which are no longer available. The price of these will be also $8.00 per volume.

Tell your friends, old members and even new members about this deal. Perhaps you want a second copy to keep unspoiled and unsoiled on your library shelf or to just replace issues that are wearing out with use. This offer is good until we run out of copies.

Please enclosed the following with each order of CPN's at this special price. On a 3 x 5 index card put what issues you wish to purchase with your full name and address on it. Also send a self address envelop. Without the above item your order may be delayed or not filled.



SPECIAL NOTICE

The editors of CPN have decided that it is time to incorporate officers into the society as described by our bylaws. In these bylaws, 3 officers are required; president, vice-president and secretary-treasurer. We think the best method of getting nominees for these officers is through the local CP chapters that have sprung up in recent years around the United States. Later we will include other countries but for now, because of time constraints, it is more expedient to focus on members from this country.

We are asking each CP chapter in this country to submit one candidate name for each of the above offices. We estimate that we would obtain 4-6 nominees for each office. A ballot with these names will be with the December issue of CPN. Members will vote for a candidate from each office and mail the ballot to Editor Steve Baker who will tabulate the results.

You can write or e-mail your candidates into Steve's address which appears below. We would appreciate that all nominees be in by **September 15th** to give us time to contact them and perhaps obtain a short statement on how they can help our organization plan for the future.

Basically, officers run for two years and meet annually either by phone or at a regional meeting to discuss the agenda. There are several issues that we are aware of that will affect this organization in the future and they should be resolved soon.

We thought it would be useful to have a list of all of the CP clubs or groups in the USA to publish in CPN. When you send in your list of nominees please mention the name of the club or group also included the name and address of the person to contact and there e-mail address if available.

Steve's street and email address is on the front inside copy under editors.

NOTICE OF INTENT TO FORM SOUTHEASTERN UNITED STATES AFFILIATE OF ICPS

Several ICPS members living in the southeastern United States have requested that an affiliate group within ICPS be formed. For several years, similar successful groups involving the Bay Area of San Francisco and the northeastern United States have been active and CP enthusiasts in the southeast feel that an equivalent group in their region would be helpful to them.

Tentatively, the first meeting and organizational planning session combined for the group will be September 23,24, and 25 1994, at the Atlanta Botanical Garden where Ron Determann has graciously offered to host the group. Further announcements will be sent out to eastern zip and postal code subscribers when the date and times are finalized. A "long weekend" meeting is envisioned with tours, general fellowship, talks, slide shows, showings of plants, plant auction, etc. A block of rooms at a nearby moderately priced motel will be set aside. There would be a registration fee to cover expenses such as meals on campus.

All ICPS members with concern, particularly southeastern members, are encouraged to drop a note to either Steve Baker or Don Schnell with their feelings on this matter and any ideas.

It is realized that the Northeastern Group has recently expanded as the Eastern Group. However, it is the feeling of many in the southeast that such a geographical designation, even with meetings alternated yearly throughout the area, is too broad to encompass a meeting for all members who may wish to attend yearly rather than in alternate years. Individuals in border areas, such as Virginia and Tennessee, may wish to attend both area meetings. Certainly, ALL ICPS members in the CP world are invited to the southeastern meetings at any time where we can all enjoy good fellowship.

It is not the intent of the CP enthusiasts in the southeast to preempt or otherwise cause difficulties with the Eastern Group. In fact, mutual exchange of meetings announcements and newsletters is encouraged as well as attendance at both annual meetings by all when possible.